X. CONCLUSIONS, RECOMMENDATIONS AND IMPLEMENTATION ISSUES

Table 11 shows amounts delivered to recharge projects in the Tucson AMA from 1993 to 1997. As is shown, the amount of water stored in the Tucson AMA in 1997 was nearly triple the 1995 level. Water storage capacity will continue to grow, with several projects scheduled to expand or begin storage in 1998.

Table 11. Water Delivered to Recharge Projects in the Tucson AMA

Recharge Facility	**1993**	**1994**	**1995**	**1996**	**1997**
Avra Valley Recharge Project (CAP)	---	---	---	2,794 AF	5,555 AF
CAVSARP Pilot (CAP)	---	---	---	154 AF	2,209 AF
Cortaro Marana ID GSF (CAP)	2,650 AF	0 AF	5,902 AF	9,581 AF	9,746 AF
BKW GSF (CAP)	250 AF	2,014 AF	4,235 AF	7,080 AF	8,648 AF
Kai Picacho GSF (CAP)	---	---	---	0 AF	6,701 AF
1st TW Pilot Injection Well (CAP)	2,394 AF	---	---	---	---
2nd TW Pilot Injection Well (CAP)	2 AF	1,574 AF	---	---	---
Sweetwater Annual Storage and Recovery (Effluent)	2,427 AF	3,209 AF	2,654 AF	2,572 AF	3,207 AF
TOTAL	**7,723 AF**	**6,797 AF**	**12,791 AF**	**22,181 AF**	**36,066 AF**

AF - acre-feet, AMA - Active Management Area, CAP - Central Arizona Project, ID - Irrigation District, GSF - Groundwater Savings Facility CAVSARP - Central Avra Valley Storage and Recovery Project, TW - Tucson Water

Although there is substantial uncertainty regarding the total recharge demand, as described in Chapter VI, it is abundantly clear that additional facilities are required. The range of capacity required in the year 2000, given the assumptions used in scenario development, is 77,100 to 158,000 AF. By 2007, the range is 74,300 to 173,500 AF. Table 12 lists all recharge projects which were evaluated by RRC, and discusses potential for AWBA participation. As uncertainties are resolved regarding recharge demand in the Tucson AMA, longer-term planning may become more reliable.

A. General Conclusions

X. IPAG has concluded that in the short term, the goal of the Regional Recharge Plan is to maximize the total amount of CAP water delivered to the Tucson AMA each year. However, over the longer term, it is imperative that achieving water management goals become the primary consideration in siting new facilities. Following this logic in the short term means

utilizing existing facilities and facilities that can be developed relatively inexpensively (these are likely to be near the CAP canal). Over time, greater investments will need to be made to ensure that water is recharged in a location where it directly benefits users and/or addresses subsidence, water quality or other environmental concerns.

- The greatest uncertainty regarding the need for additional recharge capacity stems from the lack of community consensus regarding the City of Tucson's CAP water use. One of the projects listed in the plan is the City of Tucson's Central Avra Valley Storage and Recovery Project. Tucson Water is the largest water user and holds the largest CAP subcontract in the Tucson AMA. CAVSARP is planned to recharge and recover 60,000 AF annually before the year 2005, although full build-out will be dependent on the results of pilot studies. The project was designed to replace Central Wellfield pumping, as mandated by the Water Consumer Protection Act (Proposition 200 of 1995). In the long-term, use of other options for CAP water utilization may significantly reduce the City's need for recharge at the facility, possibly adding to capacity available for other storers, including AWBA.

- Probably the most significant area of concern in the Tucson AMA from a water management perspective is the City of Tucson's Central Wellfield. It is clear that the most effective way to stabilize the water levels across the Tucson AMA and reduce the threat of subsidence is to substantially reduce or stop pumping the wells in this area. There is one proposed project in the Central Wellfield included in the RRC evaluation - the Pantano, Rillito and Tanque Verde In-channel Recharge Project. However, RRC concluded that the amount of additional water which can be safely recharged through the streambed would be substantially less than the amount required to offset present levels of groundwater withdrawal from the Central Wellfield. Although the surficial materials in the streambeds have a high infiltration rate, the water is likely to mound when it encounters the underlying less permeable materials in the vadose zone. In addition, there are so many landfills along stream channels in the central Tucson basin that many reaches are unsuitable for recharge. The Pantano, Rillito and Tanque Verde In-channel Recharge Project concept as evaluated by RRC was not being developed as of June 1998. However, the Tucson City Council has voted to pursue a pilot recharge project in Rillito Creek using a blend of effluent and groundwater in order to use existing water distribution infrastructure to evaluate the long-term recharge capacity of the streambed and answer questions about the effectiveness of recharge in the streambed in mitigating overdraft in the Central Wellfield. This pilot project will be an important step in evaluating the long-term viability of recharging CAP water in the Rillito.

  The CAVSARP, when fully operational, would permit the City to reduce and perhaps eliminate Central Wellfield pumping except during peak periods. If pumping were reduced significantly, the need for recharge within the Central Wellfield would be less urgent, but some artificial recharge still would be desirable.

- There is general agreement among IPAG members that the benefits of direct recharge in

e 12. Tucson AMA Recharge Project Descriptions and Opportunities for Water Bank Participation

Project Description	Project Status	Funding (Feasibility or Construction)	Facility or Storage Permit	Opportunity for Water Bank Participation
r **Santa Cruz Replenishment Project** USF. The proposal is to CAP water in off-channel constructed shallow spreading basins years. This facility is located south of the Santa Cruz River en Sanders Road and Avra Valley Road. (RRC #1)	Permit application for full project has been found complete and correct and is being drafted. Planned Phase I capacity is 12,000 to 13,000 AF and the design is nearly complete. Full scale design capacity is 30,000 AF per year (AFA). Phase I is fully funded by CAWCD and PCFCD. Expansion to Phase II is not currently being planned. An IGA is being developed that would result in CAWCD operating this site as a State Demonstration Facility.	PCFCD CAWCD Marana ADWR* BOR* Metro*		It is expected that most of the capacity of Phase I basins would be available to the AWBA. This project does not rank as high as others in potential for addressing water management concerns, but is an excellent location for AWBA storage, at least in the near term. Good site from the perspective of long-term storage because water is likely to continue to be available there. Marana wishes to be included in the development of recovery plans and is interested in participating in recovery activities at this site. Facility available for storage in 2000, up to 12,000 acre-feet per year. Bank not competing with anyone at this location. Should be included in the AWBA facilities plan.
la Del Oro Recharge and Recovery Project USF. The sal is to store CAP water using spreading basins and managed in- el recharge. This project is one element of the Northwest Tucson Management Area Replenishment Program (NWRP). CAP would be pumped to two recharge areas and for direct use by urses. (RRC #2)	This facility is being investigated in on-going feasibility studies, but there is no permit application. Full scale capacity estimated at 30,000 AFA. Alternative pilot testing studies are funded, but construction is not funded.	Oro Valley* Metro* ADWR* BOR* Marana* PCFCD - land		The project involves significant capital investment and there may be opportunities for the AWBA to participate in funding this project. The project rated in the highest grouping for ability to meet water management objectives. This is a long-term project that may have significant potential for interstate banking and firming local M&I supplies. Sponsors are interested in bank participation in the ramp-up years, since the facility is much larger than current demand. Sponsors (Metro and Oro Valley) will be in a position to forebear up to 10,000 AF of CAP allocations, can recover with low costs from existing wells. Could be on line in 2005. Should be considered in the facilities plan as a long-term option.
Valley Recharge Project USF stores CAP water in off-channel ucted shallow spreading basins. This facility is located to the ast of the Avra Valley Airport, less than one mile south of rine Road and about one mile east of Sanders Road. (RRC #3)	The pilot for this facility for storage of 8,300 AF has been completed. Permit for 11,000 AFA full scale project has been issued. Facility is fully operational. State demonstration facility.	CAWCD Metro BKW Farms	CAWCD - facility, storage AWBA - storage Metro - storage	This project does not rank as high as others in potential for addressing water management concerns, but is an excellent location for AWBA storage, at least in the near term. Although not currently in the Town of Marana, Marana wishes to be included in the development of recovery plans and is interested in participating in recovery activities at this site. Recovery is a key concern. About 5,000 AF could be available to the AWBA on an ongoing basis. Capacity is already being utilized by the AWBA. This facility should be included in the plan.
Mine Road USF stores CAP water in off-channel constructed w spreading basins. This facility is located to the north of Pima Road, along the Old Nogales Highway. (RRC #4)	Currently permitted to store 10,000 AF over 2 years in a pilot project. Storage began in early 1998. Full scale capacity is projected to be 30,000 AFA. Full-scale is fully funded. State demonstation facility.	Tucson CAWCD	CAWCD - facility, storage Tucson - storage	This project rated in the second highest grouping for water management objectives. It is useful from the perspective of the SAWRSA settlement, is in a critical overdraft area, is viewed positively by the City of Tucson as a location for drought protection storage. The City may build wellfields in the vicinity in the future to recover water in compliance with the SAWRSA settlement (if one is worked out). Could be used as a site to extinguish credits in support of SAWRSA. CAWCD intends to move forward with expansion of capacity to 30,000 AF by 2000. This facility should be included in the facilities plan.
al Avra Valley Storage and Recovery Project (CAVSARP) tores CAP water in off-channel shallow spreading basins. The y is located north of Mile Wide Road and a mile west of Sanders The first pilot-scale facility permit for 500AF was issued on t 1, 1996. (RRC #5)	The expanded pilot phase of this facility is operating and is permitted for storage of 10,000 AF over two years. Application for a 15,000 AFA permit is expected before expansion to full scale capacity, projected to be 60,000 AFA. Facility is fully funded, but expansion to the 15,000 AFA project and the full-scale project is dependent on results of pilot studies.	Tucson	Tucson - facility, storage	This project rated in the highest grouping for ability to meet water management objectives, contingent on development of full scale storage and recovery project to offset use of groundwater wells in the Central Wellfield. Any project that substantially reduces pressure on the Central Wellfield ranks high from a water management perspective, and the design of this project also helps with Tucson's physical availability for AWS and long-term reliability storage. The capacity is expected to be expanded to 15,000 AF next year, and to have full 60,000 AF of storage capacity and 100,000 AF of recovery capacity by 2002. 7,500 AF of capacity should be available to the AWBA in the near term. This facility should be in the facilities plan.
Avra Valley USF. The proposal is to store CAP water using ling basins north of Snyder Hill Road and south of Garcia Ranch on either side of Sandario Road. (RRC #6)	This facility is not being actively investigated. The proposed capacity for this facility is 43,800 AFA.			This facility is not being actively investigated. It is not recommended for inclusion in the facility plan at this time.
avier Arroyos USF stores CAP water by recharging through s to the west of I-10 and the main channel of the Santa Cruz #8)	A short-term pilot was conducted at this facility in summer 1997. Capacity is estimated at 9,000 AFA for the 4 arroyos. The project is partially funded, in that Tucson has supplied treated CAP water and CAWCD prepared blowouts.	SXD* - Water Protection Fund grant funded study CAWCD, Tucson, BOR - prepared blowouts		Potential water management benefit from this project is ranked in the second highest grouping. However, potential capacity is rated in the lowest grouping. An IGA would be required for the State to recognize water stored on the reservation. Potential for participation in SAWRSA settlement. Primary focus would be for riparian enhancement on the reservation, with incidental recharge benefits. Could be excellent site for AWBA to extinguish credits for Indian water rights settlement purposes, should be considered for the facilities plan.
avier Santa Cruz River USF. The proposal is to recharge of water in the main channel of the Santa Cruz River where it s Pima Mine Road, extending north to Valencia Road. (RRC #9)	This proposed facility has a possible capacity of 8,500 AFA. The San Xavier District Council has considered and approved this project, but the Tohono O'odham Nation has not formally considered this project or endorsed it. Facility is not funded.	Tucson - paid for outlet structure		Potential water management benefit from this project is ranked in the second highest grouping. However, potential capacity is in question. An IGA would be required for the State to recognize water stored on the reservation. Potential for participation in SAWRSA settlement. If CAP repayment settlement results in the need to firm water for Indian settlements, could potentially have parties pay for project. In-stream component is relatively small capacity in comparison to proposal to place basins on the terrace, which could have the same capacity as Pima Mine Road basins. Could pilot the in-channel portion soon. Possibility of expanding N of Valencia to incorporate recent City and County proposals. Should be considered for the facilities plan.

otes funding for feasibility study

12. (continued) Tucson AMA Recharge Project Descriptions and Opportunities for Water Bank Participation

Project Description	Project Status	Funding (Feasibility or Construction)	Facility or Storage Permit	Opportunity for Water Bank Participation
no, Tanque Verde & Rillito USF. The proposal is to recharge P water in Pantano, Tanque Verde & Rillito stream channels the City of Tucson's reclaimed water system for distribution. #10)	This facility is not being actively investigated. The proposed capacity is 17,000 AFA.			This facility is not being actively investigated in the form originally evaluated by the RRC. However, a stream segment of this project on the Rillito has been included in a pilot project being pursued by the City of Tucson. Ability of the AWBA to participate is unknown at this time. It is not recommended for inclusion in the plan at this time.
ley Wash at Three Points USF. The proposal is to recharge of water using spreading basins located 1.5 miles southwest of s Junction in floodplain east of Brawley Wash. (RRC #11)	This facility is not being actively investigated. The proposed capacity is 40,000 AFA.			This facility is not being actively investigated. It is not recommended for inclusion in the facility plan at this time.
ro Marana Irrigation District (CMID) GSF receives CAP in lieu of pumping groundwater. This facility is roughly located Tangerine Road north to the Pima/Pinal county border and vest of I-10 to one mile west of Trico Road. (RRC #12)	This facility is currently operating and a permit to expand from 10,000 AFA to 20,000 AFA has been issued. Facility is fully funded.	CMID CAWCD Tucson	CMID - facility CAWCD - storage Spanish Trail WC - storage Comm WC of Green Valley - storage Tucson - storage	Unless current AWBA water pricing policy is changed, this is not a likely candidate for long-term AWBA storage. Contribution of this site to groundwater management objectives is not as high as others. CMID is ideally located for pumping back into canal, although it is within the Town limits of Marana (see LSC). Existing low energy costs make the AWBA price for in-lieu unattractive. Not a likely AWBA facility, could be considered as an alternate in the future.
Farms GSF receives CAP water in-lieu of pumping dwater. This facility is roughly located south of the Santa Cruz to Emigh Road between Trico Road and Silverbell Road. (RRC	The facility is currently operating and is permitted to store 8,800 AFA. Application for expansion to 16,614 AFA has been submitted and found incomplete and incorrect. Facility is fully funded.	BKW Tucson (ADWR Augmentation Grant) for conveyance	CAWCD - facility, storage Metro - storage Tucson - storage Comm WC of Green Valley - storage	Unless current AWBA water pricing policy is changed, this is not a likely candidate for long-term AWBA storage. Contribution of this site to groundwater management objectives is not as high as others. It is located in the Town of Marana (see LSC). Tucson Water has contract to use full capacity. Not a likely AWBA facility, could be considered as an alternate in the future.
Valley Irrigation District (AVID) GSF receives CAP water in- using groundwater between Trico and Sanders Roads, on either f Avra Valley Road west of the Santa Cruz River. (RRC #14)	Facility is permitted to store 12,513 AFA and is fully funded except for a conveyance ditch.	Herb Kai	Herb Kai - facility Metro - storage	This could be a candidate for near term AWBA storage if financing can be worked out. Contribution of this site to groundwater management objectives is not as high as others, although it is in an area which has experienced overdraft. It is located outside of Marana, would require new infrastructure to get the water to the farms, and additional infrastructure for recovery. Because of recovery issues, it is not a good long-term site for firming. About 8,000 AF of demand is part of Kai farming operation. It is permitted and would take less than a year to be on line. Total cost for new ditches for delivery to the farms is about $800,000. Should be considered in the facilities plan.
Santa Cruz (Phase I) GSF and USF. The proposal is to ge CAP water in lieu of pumping groundwater at the FICO- rita farm located east of the CAP terminus at Pima Mine Road, l as to directly recharge CAP water in the Santa Cruz River el south of Pima Mine Road. #15)	This proposed project has a possible capacity of 20,000 AFA at the FICO-Sahuarita GSF and 10,000 AFA in the in-channel component. This project is currently under investigation through ADWR contract. Regional interests are participating in investigations through a technical advisory committee. Project is not funded.	ADWR*		The project ranks in the second highest grouping for water management benefits, with potential to positively impact groundwater declines, the SAWRSA settlement and possibly serve other users to the south. Subject of recent USCWUG feasibility study funded by DWR, performed by Malcolm Pirnie. Likely to take 3+ years to put together the project, no site-specific work has been done on the in-stream recharge component. ESA limitations could be serious for the recharge component of the project. Total cost estimated by MP ranges from $48 to $190 per acre-foot depending on the delivery scenario. Minimum estimated construction cost is $23 million. Should be included in the facilities plan.
CO GSF. The proposal is to deliver CAP water to the CO water recycling pond at Pima Mine Road in-lieu of pumping dwater. (RRC #16)	This project to store 10,000 AFA is currently under investigation through an ADWR contract. Facility is not funded.	ADWR*		Due to economic considerations (high pumping costs, etc.), this is not a likely candidate for AWBA storage. Volume currently being considered is 5,000 acre-feet. Could be a component of the SAWRSA settlement. Not recommended for inclusion in the facilities plan at this time.
arms at Picacho GSF receives CAP water in lieu of pumping dwater. This facility is located in Pinal County, east of the Town l Rock, south of Neuman Peak to Park Link Road and between I- l Pecan Road. (RRC #17)	This facility is operating and is permitted to store 11,231 AFA. Facility is fully funded.	Herb Kai	Metro - storage CAWCD- storage Spanish Trail WC - storage Oro Valley - storage Green Valley - storage Tucson - storage	Unless current AWBA water pricing policy is changed, this is not a likely candidate for long-term AWBA storage. Contribution of this site to groundwater management objectives is low. Existing facility has lowest costs for recovery of any GSF due to location near canal, presence of existing wells, high groundwater quality and low energy costs. Could be flexible about AWBA use of the facility. However, facility is very near northern border of AMA, is only feasible in the long-term if recovery to the canal is desirable. State lease land, any problems with long-term recovery? Recommended for inclusion in the facilities plan as an alternate for future consideration.
a Yaqui USF. The proposal is to store CAP water west of the canal in the western portion of the Pascua Yaqui Reservation spreading basins. (RRC #18)	The proposed capacity of this facility is 10,000 AFA. Facility is not funded.			There is some potential for AWBA participation in this facility, however this project is still purely conceptual at this time. Not recommended for inclusion in the facilities plan.
at Mile Wide GSF. The proposal is to store CAP water in-lieu undwater west of the CAP canal between Ft. Lowell and Mile Roads.	The proposed capacity of this facility is 627.2 AFA. An application has been received and is currently incomplete and incorrect. Facility is fully funded.	BKW		Unless current AWBA water pricing policy is changed, this is not a likely candidate for long-term AWBA storage. Because of proximity to CAVSARP, higher than other GSF's from a water management perspective. Existing facility, small volume. City has a contract for the capacity at this facility. Not recommended for inclusion in the facilities plan.

otes funding for feasibility study

underground storage facilities relative to benefits from in-lieu recharge in groundwater savings facilities depends on the siting of the projects and must be evaluated on a case-by-case basis. There are some weaknesses of in-lieu recharge relative to direct recharge. GSFs are perceived by some local water interests as postponing rather than preventing groundwater level declines, because after the GSF contracts are completed, water users are likely to resume pumping groundwater. However, the benefits of some GSF's may outweigh those of some USF's due to lower cost or local contributions to water management goals.

3. Some important water management objectives of recharge are specific to locations dispersed throughout the Tucson AMA. One or two large recharge facilities might provide equal capacity at a lower price than many smaller projects, but they would be unlikely to address the location-specific objectives. The objectives of equity and local acceptability also may direct recharge planning toward decentralization.

- Based on present projections of recharge demand, IPAG does not anticipate the need to identify and study additional recharge sites beyond those identified in this report *for the sole purpose of increasing recharge capacity*. An analysis of the recharge capacity that would be provided by projects with identified sponsors showed that sufficient capacity through 2007 would be available if all these projects were constructed. However, several of the identified projects are only in the conceptual phase and substantial additional work will be required to evaluate these projects further and confirm whether the sponsors are willing to move forward. Also, if projects on the Indian reservations do not move forward, more capacity will have to be developed off the reservations. IPAG intends the regional planning process to remain open to consideration of new sites proposed to meet other objectives, such as meeting long-term water management goals.

- The RRC did not evaluate any recharge projects that involved well injection, primarily because Proposition 200 precludes the use of CAP water for well injection unless it meets the Avra Valley groundwater quality standard and is free of disinfection by-products. This standard is significantly stricter than federal drinking water regulations. In retrospect, it appears that well injection should not have been eliminated from consideration. Entities other than Tucson Water are not precluded from utilizing this option. Moreover, well injection may be a superior method from the perspectives of mitigating subsidence and certainty of hydrologic effect of the project. It also has major advantages in that it can utilize existing infrastructure if wells are appropriately constructed. The City's two pilot well-injection projects in the Central Wellfield were quite successful for the short period of time they operated while CAP water delivery was under way. The concerns about disinfection by-products do not appear to be justified based on the experiences of multiple other states. However, the Tucson AMA is initiating an evaluation of the transport and fate of disinfection byproducts and organic precursors associated with the treatment of CAP water after recovery. The results of this study will be available in the summer of 1998.

B. Recommendations to the AWBA

Given the fact that the Tucson AMA has up to 250,000 acre-feet of CAP water available and direct delivery appears unlikely in the near future, it is clear that the area has a long way to go in developing sufficient recharge capacity. Substantial new infrastructure will be required. It would be extremely advantageous if the AWBA could assist in funding one or more new facilities by providing a guaranteed revenue stream.

- The Tucson AMA has identified three geographic areas where additional storage may substantially increase the likelihood of attaining groundwater management objectives: 1) Tucson's Central Wellfield, where historic groundwater declines and risk of subsidence could possibly be mitigated; 2) the Cañada del Oro basin, where groundwater levels are relatively stable but significant increases in water demand are projected; and, 3) the CAP terminus near Green Valley, where water levels are declining, increases in water demand are projected, and there are significant concerns associated with protecting the water supplies on the San Xavier District.

  Although the most serious water management concerns are associated with Tucson's Central Wellfield, it is anticipated that a combination of reduced groundwater pumping (made possible by development of CAVSARP) and proposed in-stream projects will limit these concerns. The Central Wellfield is a potential location for AWBA activity in the context of storing supplies to offset future shortages. However, in the short term it may be difficult for AWBA to overcome issues such as the distance from the canal and political and jurisdictional considerations. AWBA participation in CAVSARP will benefit the Central Wellfield if the project is operated as planned to offset use of groundwater wells and the City of Tucson does not fully utilize CAVSARP storage capacity.

  The AWBA could positively impact water management objectives in the Cañada del Oro basin. There have been ongoing cooperative investigations of the possibilities for direct recharge in this area, primarily because of projected increases in demand and the desire to achieve safe-yield in this localized area. At this time, the groundwater table is largely stable, except in the lower reaches of the watershed. Bringing "wet water" to the region is a top priority for Metro Water District, the Town of Oro Valley and the Town of Marana. Current investigations into the Cañada del Oro Recharge and Recovery Project involve both CAP water and effluent (reclaimed water) deliveries. Both require significant capital investment because pumping stations and up to 16 miles of pipelines may be required.

  In the Green Valley/Sahuarita area, potential in-lieu and direct storage facilities (in addition to the Pima Mine Road project) are currently being evaluated by a consultant under contract with the Tucson AMA office. Recharge in this area will help offset existing pumping and the effects of expanding population. AWBA participation in the FICO-Sahuarita Groundwater Savings Facility would be especially beneficial. In addition, there has been substantial damage on the San Xavier District due to dewatering.

Representatives of the District and the Tohono O'odham Nation have indicated interest in recharge on or near the reservation to raise the groundwater level, restore riparian habitat, and possibly to generate credits that could be transferred off of the Reservation for use elsewhere in the AMA. There may be significant potential for AWBA activities in this location.

- Despite the strong support for direct recharge, IPAG feels that in-lieu recharge will be necessary in the Tucson AMA in order to meet the short-term goal of maximizing CAP water delivery. AWBA will need to recharge substantial quantities of water in the next few years (30,000 to 60,000 AF/year) in order to utilize the 1997 funds that have been rolled over. AWBA has historically assumed that in-lieu recharge will not be possible in the Tucson AMA because existing arrangements within the AMA involve paying less money for the in-lieu water than AWBA charges in other AMAs. The assumption that all agricultural users are unwilling to pay the AWBA price (even if some farmers pay more than others) should definitely be more carefully evaluated. There is also a possibility that other users in the Tucson AMA would be willing to negotiate a price that is closer to the AWBA price. Options such as adding a facilities charge for in-lieu facilities similar to the practice for direct facilities may assist in reaching a suitable price. Finally, there may be justification for AWBA to charge a different price for in-lieu water in the Tucson AMA than in other AMAs, given the shortage of direct recharge facilities and other considerations.

- If all of the projects listed in the RRP are implemented in the near term (a rather unlikely outcome), there could be between 85,000 and 90,000 AF of developed capacity *in excess* of local demand in the year 2000 and between 115,000 and 120,000 AF in the year 2007. This would result in sufficient capacity to fully utilize AWBA water. However, approximately 40 to 45 percent of the total developed capacity would be provided by GSFs and would be unavailable to AWBA if its pricing policies are not reconsidered. In addition, 10 percent or more of the total developed capacity could be on Indian reservation land. An IGA would be necessary before AWBA (or other non-Indian entities) could use any of this capacity for non-Indian storage.

- One issue that is difficult to address is the degree to which existing users in the Tucson AMA will utilize existing recharge capacity. At this time, it is clear that the demand for storage capacity far exceeds the current availability, yet local interests are so anxious to facilitate the activities of the AWBA that they have stepped aside to provide capacity. Since AWBA is intended to recharge water that would not otherwise have been recharged, this is somewhat problematic. It may be important for AWBA to work on developing facilities within the Tucson AMA that might not otherwise have been built, or at least focus on facilities within the AMA with storage capacity that is not currently spoken for to avoid the possibility of competing for capacity.

- The ability to recover stored water should be a factor in selecting AWBA facilities. If the objective of storage is to firm up municipal supplies, the specific needs of municipal

providers for “wet water” during times of shortage should be considered. If other management objectives are to be pursued, different recovery criteria will apply.

- IPAG recommends that AWBA adopt the IPAG (short) list (see Table 12) of recharge facilities as its list of feasible recharge sites for the Tucson AMA. Further study of the suitability of recharge sites for AWBA purposes should focus, at least initially, on these facilities. For 1998, AWBA efforts should be directed toward currently operating recharge facilities and facilities which are projected to be operating in 1998. The direct facilities include Pima Mine Road, Avra Valley Recharge Project, and CAVSARP. The GSFs include: Cortaro-Marana Irrigation District, BKW Farms, Kai Picacho Farms and Avra Valley Irrigation District. The capacity at Avra Valley Irrigation District is new in 1998, whereas the other three GSFs were operating in 1997.

In conclusion, it appears there are substantial opportunities to pursue recharge projects in the Tucson AMA. AWBA is encouraged to continue to work with IPAG in the development of its facilities plan and operating plans. The status of projects changes very quickly, and the relative merits of various facilities may change over time. The Regional Recharge Plan is a work in progress, and there are obvious benefits to both parties in keeping in close communication.

C. Implementation Issues

At this time, it is anticipated that the Regional Recharge Plan will be up-dated in response to new projects, new interests of participating entities, new participants, and changes in institutional, legal and political conditions in the Tucson AMA. Implementation of the RRP and participation in the process is entirely voluntary.

On-going responsibilities of participants could include:

- Monitoring the progress of projects listed in the Plan and responding with changes to the Plan if projects fail to progress according to Plan assumptions;

- Monitoring demand for recharge capacity for indications that additional projects should be developed;

- Monitoring progress in meeting water management and environmental objectives for indications that additional projects should be developed;

- Identifying potential project sites and sponsors and adding projects to the Plan as needed;

- Evaluating information that could alter the assessment of projects listed in the Plan;

- Identifying significant deviations from Plan assumptions and responding as appropriate.